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1. Find which of the variables x , y , z and u represent rational numbers and which irrational numbers:

- (i) $x^2 = 5$
- (ii) $y^2 = 9$
- (iii) $z^2 = .04$
- (iv) $u^2 = 17/4$

Solution:

(i) $x^2 = 5$
On solving, we get
 $\Rightarrow x = \pm \sqrt{5}$
Hence, x is an irrational number.

(ii) $y^2 = 9$
On solving, we get
 $\Rightarrow y = \pm 3$
Hence, y is a rational number.

(iii) $z^2 = .04$
On solving, we get
 $\Rightarrow z = \pm 0.2$
Hence, z is a rational number.

(iv) $u^2 = 17/4$
On solving, we get
 $\Rightarrow u = \pm \sqrt{17/2}$
 $\sqrt{17}$ is irrational.
Hence, u is an irrational number

2. Find three rational numbers between

- (i) -1 and -2
- (ii) 0.1 and 0.11
- (iii) $5/7$ and $6/7$
- (iv) $1/4$ and $1/5$

Solution:

(i) -1 and -2
Three rational numbers between -1 and -2 are -1.1 , -1.2 and -1.3 .

(ii) 0.1 and 0.11
Three rational numbers between 0.1 and 0.11 are 0.101 , 0.102 and 0.103 .

(iii) $5/7$ and $6/7$
 $5/7$ can be written as $(5 \times 10)/(7 \times 10) = 50/70$
Similarly,

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Rational And Irrational Numbers

Rational And Irrational Numbers

Rational Numbers

A rational number is a number that can be written as a ratio. That means it can be written as a fraction, in which both the numerator (the number on top) and the denominator (the number on the bottom) are whole numbers.

The number 8 is a rational number because it can be written as the fraction $8/1$. Likewise, $3/4$ is a rational number because it can be written as a fraction.

Even a big, clunky fraction like $7,324,908/56,003,492$ is rational, simply because it can be written as a fraction.

Every whole number is a rational number, because any whole number can be written as a fraction. For example, 4 can be written as $4/1$, 65 can be written as $65/1$, and 3,867 can be written as $3,867/1$.

Know More About Rational Numbers Properties

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Rational Numbers: - Every integer and fractions are rational numbers. It can always be denoted as p/q , where p and q are integers and q is not equal to 0.

Thus for example the rationals include $\{0, 5/2, -18, -4/3, 27/5\}$. We usually write rational numbers in their lowest terms, for example $8/10$ is usually written $4/5$. We commonly write rationals in decimal form, so that $1/4$ is the same as 0.25 , $13/8 = 1.625$ and $4/5 = 0.8$.

Some rationals, however, when written in decimal form don't stop a few places after the decimal. For example $1/3 = 0.333...$, $10/11 = 0.909090...$ and $3/13 = 0.230769230769...$ When you write a rational number in decimal form you obtain



8. A rational number between $\sqrt{2}$ and $\sqrt{3}$ is

- (A) $(\sqrt{2} + \sqrt{3})/2$
- (B) $(\sqrt{2} \cdot \sqrt{3})/2$
- (C) 1.5
- (D) 1.8

Solution:

(C) 1.5

Explanation:

$\sqrt{2} = 1.4142135\dots$ and $\sqrt{3} = 1.732050807\dots$

(A) $(\sqrt{2} + \sqrt{3})/2 = 1.57313218497\dots$ is a non-terminating and non-recurring decimal and therefore is an irrational number.

(B) $(\sqrt{2} \cdot \sqrt{3})/2 = 1.22474487139\dots$ is a non-terminating and non-recurring decimal and therefore is an irrational number.

(C) 1.5 is a terminating decimal and therefore is a rational number.

(D) 1.8 is a terminating decimal and therefore is a rational number.

Here both 1.5 and 1.8 are rational numbers. But, 1.8 does not lie in between $\sqrt{2} = 1.4142135\dots$ and $\sqrt{3} = 1.732050807\dots$. Whereas 1.5 lies in between $\sqrt{2} = 1.4142135\dots$ and $\sqrt{3} = 1.732050807\dots$. Hence, (C) is the correct option.

9. The value of 1.999... in the form p/q , where p and q are integers and $q \neq 0$, is

- (A) 19/10
- (B) 1999/1000
- (C) 2
- (D) 1/9

Solution:

(C) 2

Explanation:

(A) $19/10 = 1.9$

(B) $1999/1000 = 1.999$

(C) 2

(D) $1/9 = 0.111\dots$

Let $x = 1.9999\dots \dots (1)$

Multiply equation (1) with 10

$10x = 19.9999\dots \dots (2)$

Subtract equation (1) from equation(2),

We get,

$9x = 18$

$x = 18 / 9$

$x = 2$

Therefore,

$x = 1.9999\dots = 2$

Hence, (C) is the correct option.

10. $2\sqrt{3} + \sqrt{3}$ is equal to

- (A) $2\sqrt{6}$
- (B) 6

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Explanation:
The product of any two irrational numbers is sometimes rational and sometimes irrational.
Hence, (D) is the correct option

5. The decimal expansion of the number $\sqrt{2}$ is

- (A) finite decimal
- (B) 1.41421
- (C) non-terminating recurring
- (D) non-terminating non-recurring

Solution:

(D) non-terminating non-recurring

Explanation:

The decimal expansion of the number $\sqrt{2} = 1.41421356237\dots$

Hence, (D) is the correct option

6. Which of the following is irrational?

- (A) $14/9$
- (B) $\sqrt{12}/3$
- (C) $\sqrt{7}$
- (D) $\sqrt{81}$

Solution:

(C) $\sqrt{7}$

Explanation:

(A) $14/9 = 1.555\dots$

(B) $\sqrt{12}/3 = 2\sqrt{3}/3 = 2$

(C) $\sqrt{7} = 2.64575131106$

(D) $\sqrt{81} = 9$

Here, (C) $\sqrt{7} = 2.64575131106$, is a non terminating decimal expansion.

Hence, (C) is the correct option

7. Which of the following is irrational?

- (A) 0.1416
- (B) $\sqrt{1416}$
- (C) $\sqrt{14}$
- (D) 0.4014001400014...

Solution:

(D) 0.4014001400014...

Explanation:

A number is irrational if and only if its decimal representation is non-terminating and non-recurring.

(A) is a terminating decimal and therefore cannot be an irrational number.

(B) is non-terminating and recurring decimal and therefore cannot be irrational.

(C) is a non-terminating and recurring decimal and therefore cannot be irrational.

(D) is a non-terminating and non-recurring decimal and therefore is an irrational number.

Hence, (D) is the correct option.

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Mathematics is a vast field of study that deals with the properties and relationships of numbers. It is a branch of science that seeks to understand the patterns and structures of the universe. The study of numbers is one of the oldest and most fundamental of human endeavors. It has led to the development of many other sciences, including physics, chemistry, and biology. The study of numbers is also a practical skill that is essential for many aspects of daily life, from budgeting to engineering. The study of numbers is a journey of discovery that never ends. There is always more to learn about the world of numbers, and the more we know, the more we appreciate the beauty and power of this ancient science. The study of numbers is a journey of discovery that never ends. There is always more to learn about the world of numbers, and the more we know, the more we appreciate the beauty and power of this ancient science.

When speaking about the reals, sometimes "almost all" can mean "all reals but a null set". Similarly, if S is some set of reals, "almost all numbers in S" can mean "all numbers in S but those in a null set". The real line can be thought of as a one-dimensional Euclidean space. In the more general case of an n-dimensional space (where n is a positive integer), these definitions can be extended to include the case of a particular class of function referred to as the rational equivariant functions. We investigate which elliptic zeta functions arising from integrals of power of p, where p is the Weierstrass p-function attached to a rank two lattice of C, yield rational equivariant functions. Our concern in this survey is to provide certain results on the Rational Number. The rational number whose numerator and denominator both are equal or they are reducible to equal. e.g., Note: There are infinitely many rational numbers between any two given rational numbers. Symbol $\sqrt{\quad}$ indicate the square root of the number e.g., $\sqrt{4} = 2$, though both 2 and -2 are square roots of 4. The term Homo economicus, or economic man, is the portrayal of humans as agents who are consistently rational and narrowly self-interested, and who pursue their subjectively defined ends optimally. It is a word play on Homo sapiens, used in some economic theories and in pedagogy. In game theory, Homo economicus is often modelled through the assumption of perfect rationality.

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